Name_____ Date_____

6.5 Practice A

In Exercises 1–3, use $\log_5 3 \approx 0.683$ and $\log_5 6 \approx 1.113$ to evaluate the logarithm.

1. $\log_5 2$
2. $\log_5 18$
3. $\log_5 9$

In Exercises 4–6, expand the logarithmic expression.

4. $\log_2 5x$
5. $\log 7x^4$
6. $\log_6 \frac{2x}{y}$

7. Describe and correct the error in expanding the logarithmic expression.

$\times$ $\log_4 3x = 3 \log_4 x$

In Exercises 8–11, condense the logarithmic expression.

8. $\log_7 3 - \log_7 5$
9. $\log 10 - \log 5$
10. $3 \ln x + 9 \ln y$
11. $\log_2 9 + \frac{1}{2} \log_2 y$

In Exercises 12–14, use the change-of-base formula to evaluate the logarithm.

12. $\log_5 3$
13. $\log_2 11$
14. $\log_6 10$

15. Your friend claims that you can use the change-of-base formula to write the expression $\ln x$ as a common logarithm. Is your friend correct? Explain your reasoning.

16. For a sound with intensity I (in watts per square meter), the loudness $L(I)$ of the sound (in decibels) is given by the function $L(I) = 10 \log \frac{I}{I_0}$, where I_0 is the intensity of a barely audible sound (about 10^{-12} watts per square meter). The sound of a coach's whistle is five times greater than the intensity of the referee's whistle. Find the difference in the decibel levels of the sounds made by the coach and the referee.

Name _____ Date _____

6.5 Practice B

In Exercises 1–3, use $\log_5 3 \approx 0.683$ and $\log_5 6 \approx 1.113$ to evaluate the logarithm.

1. $\log_5 81$
2. $\log_5 \frac{1}{6}$
3. $\log_5 \frac{1}{2}$

In Exercises 4–6, expand the logarithmic expression.

4. $\log_3 12x^7$
5. $\log_6 \frac{5x^2}{y^3}$
6. $\log_8 6\sqrt{xy}$

7. Describe and correct the error in expanding the logarithmic expression.

$$\times \quad \ln \sqrt[3]{xy} = \frac{1}{3} \ln x + \ln y$$

In Exercises 8–11, condense the logarithmic expression.

8. $5 \log_9 x - \log_9 4$
9. $\log_8 5 + \frac{1}{4} \log_8 x$
10. $2 \ln 4 + 5 \ln x + 3 \ln y$
11. $\log_6 9 + 2 \log_6 \frac{1}{3} - 3 \log_6 x$

In Exercises 12–14, use the change-of-base formula to evaluate the logarithm.

12. $\log_8 15$
13. $\log_3 30$
14. $\log_4 \frac{8}{17}$

15. Your friend claims you can use the change-of-base formula to write the expression $\frac{\ln y}{\ln 3}$ as a logarithm with base 3. Is your friend correct? Explain your reasoning.

16. For a sound with intensity I (in watts per square meter), the loudness $L(I)$ of the sound (in decibels) is given by the function $L(I) = 10 \log \frac{I}{I_0}$, where I_0 is the intensity of a barely audible sound (about 10^{-12} watts per square meter). The bass guitar player in a band turns up the volume of the speaker so that the intensity of the sound triples. By how many decibels does the loudness increase?